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# Long-lived quantum memories using 3D niobium cavities

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## Résumé

Long-lived memory qubits can significantly reduce error correction overheads in future quantum processors. Superconducting cavities, capable of reaching quality factors well beyond one billion, are promising candidates for such quantum memories. However, these high-Q cavities are yet to be leveraged to achieve extended coherence times due to their coupling to noisy ancilla qubits.

We introduce a quantum memory using a novel niobium cavity controlled by a weakly-coupled transmon ancilla. We show that a single-photon qubit encoded in the cavity achieves lifetimes an order of magnitude beyond the current state of the art (1). (1) O. Milul, B. Guttel et al., PRX Quantum 4, 030336 (2023).

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